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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/534,585	05/11/2005	Kang-Ho Ahn	4684-023	4442

22429 7590 11/28/2008

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EXAMINER	
TAI, XIUYU	
ART UNIT	PAPER NUMBER
1795	
MAIL DATE	DELIVERY MODE
11/28/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/534,585	AHN ET AL.	
	Examiner	Art Unit	
	Xiuyu Tai	1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *11 May 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,4,6,7,9,10,12 and 20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1, 4, 6,7,9,10,12,and 20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments filed on 9/9/2008 have been fully considered but they are not persuasive.

2. In the response to the argument that replacing the capillary of Ahn with an electrode would have changed the principle of operation, it should be noted that the particles produced within the device of Ahn is from chemical reaction of highly charged particles/ions under high temperature (page 8, line 20-page9-line 3 of Ahn). Pratsinis teaches that particles can be produced across high temperature region utilizing corona electric field which generates charged particles/ions (col. 3, line 50-54). Therefore, interchanging the capillary of Ahn with an electrode of Pratsinis does not change the principle of operation.

3. In response to the argument that the electrode of Pratsinis are not essential for making the particles, Pratsinis point out in SUMMARY OF THE INVENTION that the process of the present invention, particularly the embodiment which utilized the corona electric field generated from electrodes, may be used to form a wide variety of particles (col. 3, line 56-59). Therefore, the electrodes of Pratsinis are used to produce corona discharge which generates ions for manufacturing particles.

4. In response to the argument that the electrodes of Pratsinis are not parallel to flow of reactants, Pratsinis also suggests that the electrodes may be positioned anywhere on the vertical axis within the reaction area (i.e. parallel to the flow of reactants, col. 8, line 48-51).

5. In response to the argument regarding the forth reason to traverse examiner's rejection, it should be noted that through hole 32 of Ahn for injecting carrier gas is merely intended use.

Response to Amendment

6. The amendment filed on 9/9/2008 is objected to under 35 U.S.C. 132(a) because it introduces new matter into the disclosure. 35 U.S.C. 132(a) states that no amendment shall introduce new matter into the disclosure of the invention. The added material which is not supported by the original disclosure is as follows: the instant specification does not support

(1) "wherein a direction of a corona discharge electric field is substantially parallel to flow of the reaction gas" as cited in amended claims 1, 9 and the added new claim 20;

(2) a guide duct is in the form of an electrode as cited in the added new claim 20;

(3) the heating means is a flame as cited in the added new claim 20.

Applicant is required to cancel the new matter in the reply to this Office Action.

Claim Rejections - 35 USC § 112

7. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

8. Claims 1, 4, 6, 7, 9, 10, 12, and 20 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s)

contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Claims 1, 9, and 20 contain subjection matter of ""wherein a direction of a corona discharge electric field is substantially parallel to flow of the reaction gas" while the instant specification does not support such description. The added new claim further contains subject matter of "a first electrode in the form of a guide duct" and "the heating means is a flame" which are not supported by the instant specification. Claims4, 6, 7, 10, and 12 are also rejected due to the dependency to the parent claims. For the purpose of examination, 'a first electrode" is interpreted as an object that connects to a power supply and "the guide duct" of Ahn is considered as an electrode. The examiner will examine "the heating means is a heater" which is supported by the instant specification.

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

10. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.

4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

11. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

12. Claims 1, 6, 7, 9, 10, 12, and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ahn et al (WO 01/83101) in view of Pratsinis et al (U.S. 5,861,132).

13. Regarding claim 1, Ahn et al disclose an apparatus for manufacturing ultra-fine particles. The apparatus comprises: (1) a guide duct 20 connecting to a low voltage of a power supply 40 (Figure 1; page 4 line18-27); (2) a gas injection means 51 supplying gas through through-hole 31 (Figure 2; page 6, line 5-11); (3) a fuel gas injection means 55 through through-hole 35 (Figure 2; page 6, line 5-14); (4) a high voltage applied from a power supply 40 to generate voltage different (Figure 1; page 4, line 26); (5) a heater 60 which is disposed on an outer surface of the guide duct (Figure 1; page 5, line 10); (6) a collecting plate 70 disposed to be spaced apart form outlet of the guide duct (Figure 1; page 5, line 15); (7) a supporting member 30 fitted into the guide duct 20 (Figure 1; page 4, line 19) and the supporting member 30 having a through-hole 32

(Figure 1; page 4, line 21-22); and (8) a gas injection means 52 through the through-hole 32 (Figure 1; page 4, line 24).

Ahn et al fail to teach a discharging means to generate ions through electric discharge from a discharge electrode. However, Pratsinis et al disclose a process for making ceramic particles using a corona discharge electric field. The reference of Pratsinis states that small particle size product may be produced by applying an electric field to ionize reactants before in the production of silicon dioxide (col. 3, line 15-18), and further teaches that a corona discharge electric field is utilized in the reaction area by using electrodes in the form of needles (col. 8, line 23-32) to produce particles having high surface area, high anatase content , and high purity (col. 7, line 65 & col. 8, line 1-5). Therefore, it would be obvious for one having ordinary skill in the art to utilize a corona discharge electric field as taught by Pratsinis in lieu of the electrospry capillary 10 of Ahn in order to produce particles having high surface area, high anatase content, and high purity using a corona discharge electric field. As a result, the power supply 40 is connected between the corona discharge electrode and the guide duct of Ahn/Pratsinis wherein a high voltage is applied to the electrode and a low voltage having the same polarity as the voltage applied to the electrode is applied to the guide duct 20 (page 4, line 26-28 of Ahn). Furthermore, the direction of corona discharge in Ahn/Pratsinis is parallel to the flow of the reaction gas (Figure 1 of Ahn).

14. Regarding claim 6, Ahn also disclose a plurality of mutually connected guide ducts 25 insulated by insulating material 27 (Figure 3; page 6, line 26-29; claim 4), reads on the instant claim.

15. Regarding claim 7, the needle electrode of Pratsinis is made of an electrically conductive material having a diameter about 50-100 um (col. 8, line 30-33) that is a wire electrode, reads on the instant claim.

16. Regarding claim 9, Ahn et al disclose an apparatus for manufacturing ultra-fine particles. The apparatus comprises: (1) first guide duct 21 connecting to a low voltage of power supply 40 (Figure 2; page 5, line 27& page 6 line 1-2); (2) a second guide duct 23 disposed coaxially with the first guide duct 21 (Figure 2; page 6, line 3); (3) a third guide duct 25 disposed coaxially with the first guide duct 21 (Figure 2; page 6. line 4); (4) a carrier gas injection means 51 supplying carrier gas to the first guide duct 21 (Figure 2; page 6, line 10-11); (5) a gas injection means 53 for supplying reaction gas into the second guide duct 23 (Figure 2; page 6, line 13-14); (6) a fuel gas injection means 55 for supplying fuel gas into the third guide duct 25 (Figure 2; page 6, line 14-15); (7) a high voltage applied from a power supply 40 to generate voltage different (Figure 1; page 4, line 26); (8) a heater 60 which is disposed on an outer surface of the guide duct (Figure 1; page 5, line 10); and (9) a collecting plate 70 disposed to be spaced apart form outlet of the guide duct (Figure 1; page 5, line 15). It should be noted that sheath gas injection means 53 is fully capable of delivering reaction gas.

Ahn et al fail to teach a discharging means to generate ions through electric discharge from a discharge electrode. However, Pratsinis et al disclose a process for making ceramic particles using a corona discharge electric field. The reference of Pratsinis states that small particle size product may be produced by applying an electric field to ionize reactants before in the production of silicon dioxide (col. 3, line 15-18),

and further teaches that a corona discharge electric field is utilized in the reaction area by using electrodes in the form of needles (col. 8, line 23-32) to produce particles having high surface area, high anatase content , and high purity (col. 7, line 65 & col. 8, line 1-5). Therefore, it would be obvious for one having ordinary skill in the art to utilize a corona discharge electric field as taught by Pratsinis in lieu of the electrospry capillary 10 of Ahn in order to produce particles having high surface area, high anatase content, and high purity using a corona discharge electric field. As a result, the power supply is connected between the corona discharge electrode and the guide duct of Ahn/Pratsinis.

17. Regarding claim 10, the supporting member 30 of Ahn is fitted into the first, second , and third guide duct through holes 31, 33, and 35 (Figure 2; page 6, line 7-10), reads on the instant claim.

18. Regarding claim 12, Ahn et al fail to teach a fourth guide duct for supplying sheath gas. However, Pratsinis et al disclose a process for making ceramic particles using a corona discharge electric field. The reactor of Pratsinis comprises five concentric quarts tubes (col. 4, line 40-41), and further states that the number of concentric tubes in the reactor and their size can be varied depending upon the requirement of the particular reaction (col. 4, line 42-44). Ahn also teaches a sheath gas for preventing heat of flames from being transferred to the first guide duct 21 when the flames occur at the end of the third guide duct 25 (page 6, line 15-17). Therefore, it would be obvious for one having ordinary skill in the art to include a fourth guide duct as suggested by Pratsinis for introducing a sheath gas in order to prevent heat of flames from being transferred to the first guide duct 21 of Ahn.

19. Regarding claim 20, Ahn et al disclose an apparatus for manufacturing ultra-fine particles. The apparatus comprises: (1) a guide duct 20 connecting to a low voltage of a power supply 40 (Figure 1; page 4 line18-27); (2) a gas injection means 51 supplying gas through through-hole 31 (Figure 2; page 6, line 5-11); (3) a fuel gas injection means 55 through through-hole 35 (Figure 2; page 6, line 5-14); (4) a high voltage applied from a power supply 40 to generate voltage different (Figure 1; page 4, line 26); (5) a heater 60 which is disposed on an outer surface of the guide duct (Figure 1; page 5, line 10); (6) a collecting plate 70 disposed to be spaced apart form outlet of the guide duct (Figure 1; page 5, line 15); (7) a supporting member 30 fitted into the guide duct 20 (Figure 1; page 4, line 19) and the supporting member 30 having a through-hole 32 (Figure 1; page 4, line 21-22); and (8) a gas injection means 52 through the through-hole 32 (Figure 1; page 4, line 24).

Ahn et al fail to teach a discharging means to generate ions through electric discharge from a discharge electrode. However, Pratsinis et al disclose a process for making ceramic particles using a corona discharge electric field. The reference of Pratsinis states that small particle size product may be produced by applying an electric field to ionize reactants before in the production of silicon dioxide (col. 3, line 15-18), and further teaches that a corona discharge electric field is utilized in the reaction area by using electrodes in the form of needles (col. 8, line 23-32) to produce particles having high surface area, high anatase content , and high purity (col. 7, line 65 & col. 8, line 1-5). Therefore, it would be obvious for one having ordinary skill in the art to utilize a corona discharge electric field as taught by Pratsinis in lieu of the electrospry capillary

10 of Ahn in order to produce particles having high surface area, high anatase content, and high purity using a corona discharge electric field. As a result, the power supply 40 is connected between the corona discharge electrode and the guide duct of Ahn/Pratsinis wherein a high voltage is applied to the electrode and a low voltage having the same polarity as the voltage applied to the electrode is applied to the guide duct 20 (page 4, line 26-28 of Ahn). The electrode of Ahn/Pratsinis is within the guide duct 20 while the heater 60 is outside of the guide duct 20 (Figure 1). Furthermore, the direction of corona discharge in Ahn/Pratsinis is parallel to the flow of the reaction gas (Figure 1 of Ahn).

20. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ahn et al (WO 01/83101) and Pratsinis et al (U.S. 5,861,132) as applied to claim 1 above, and further in view of Carnahan et al (U.S. 5,420,424).

21. Regarding claim 4, Ahn/Pratsinis fail to teach a guide electrode surrounding the discharge electrode. However, Carnahan et al disclose an ion mobility spectrometer using a corona discharge. The ionizer comprises a corona wire 60 (via electrode 32) and a shield electrode 64 (Figure 2; col. 6, line 12-28). The reference of Carnahan teaches that the shield electrode 64 is introduced between the electrode 22 and 32 and electrodes 32/64 are maintained at the same potential to enhance ion generation on the tip of the corona wire 60 (col. 7, line 20-25). Therefore, it would be obvious for one having ordinary skill in the art to include a shield electrode as suggested by Carnahan in order to enhance ion generation, hence promoting particle production in the apparatus of Ahn/Pratsinis.

Conclusion

22. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Xiuyu Tai whose telephone number is 571-270-1855. The examiner can normally be reached on Monday - Friday, 7:30 AM - 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Alexa Neckel can be reached on 571-272-1446. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/X. T./
Examiner, Art Unit 1795

11/21/2008

/Alexa D. Neckel/
Supervisory Patent Examiner, Art Unit 1795